

CLAIMS

What is claimed is:

1. An electrode member, comprising a substrate member and an antimony modified tin dioxide film coating member,

5 wherein the coating member comprises connected particles from about 3 nm to about 5 nm in size, and

wherein the particles comprise Sn and Sb in a ratio from about 6:1 to about 10:1.

2. The electrode member according to claim 1, wherein the substrate member is made of a material selected from the group consisting of titanium, gold coated titanium and
10 other inert conducting materials.

3. The electrode member according to claim 1, wherein the substrate member is made of titanium.

4. The electrode member according to claim 3, wherein the substrate member is spot-welded with a titanium wire.

15 5. An electrode member comprising a substrate member and a coating member, wherein the coating member comprises a tin dioxide modified by antimony.

6. The electrode member according to claim 5, wherein the coating member comprises connected particles of less than 5 nm in size.

7. The electrode member according to claim 6, wherein the connected particles
20 are from about 3 nm to about 5 nm in size.

8. The electrode member according to claim 5, wherein the coating member comprises connected particles of Sn and Sb.

9. The electrode member according to claim 8, wherein the Sn and Sb are in an atomic ratio of more than 6:1.

10. The electrode member according to claim 8, wherein the Sn and Sb are in an atomic ratio of less than 10:1.

11. The electrode member according to claim 5, wherein the coating member comprises nickel.

5 12. The electrode member according to claim 11, wherein the Sb and Ni are in an atomic ratio of less than 10:1.

13. The electrode member according to claim 11, wherein the Sb and Ni are in an atomic ratio of more than 4:1.

10 14. A method of making an electrode member for use in generating ozone, comprising:

providing a substrate member comprising an inert conducting material;
providing a coating member comprising an antimony modified tin dioxide;
affixing the substrate member with the coating member;
drying the coated substrate member at about 100°C for about ten minutes;
15 calcining the coated substrate member at about 520°C;
repeating the above coating, drying, and calcining steps.

15. The method according to claim 14, wherein the coating member comprises $\text{SnCl}_4 \cdot 5\text{H}_2\text{O}$ and SbCl_3 in an ethanol-HCl mixture.

20 16. A method of generating ozone using the electrode member made according to claim 1, comprising:

using the electrode member as a working electrode;
applying a constant potential to the electrode member at room temperature;
wherein the ozone generated is dissolved in an electrolyte.

25 17. The method of claim 16, wherein the constant potential to the electrode member applied to the electrode member ranges from about 1.5V to about 3.0V.

18. A use of the electrode according to claim 1 for direct generation of ozone in water or through water into a gaseous state.

19. The use of the electrode according to claim 18 for electrochemical generation of ozone at a concentration of electrolyte from about 0.01 M to about 0.5 M.

5 20. The use of the electrode according to claim 19, wherein the electrolyte is selected from the group consisting of HClO_4 , H_2SO_4 and H_3PO_4 .

21. An ozone generation system comprising an electrode according to claim 1 for electrochemical generation of ozone.

10 22. The ozone generation system according to claim 21, further comprising a solid polymer electrolyte.

23. The ozone generation system according to claim 22, wherein the solid polymer electrolyte is Nafion.

24. An ozone material comprising approximately 35 mg/l aqueous ozone with over 15% current efficiency.

15 25. The ozone material according to claim 24, wherein the 15% current efficiency only accounts for the dissolved ozone.

26. The ozone material according to claim 24, wherein the aqueous ozone is generated in a 6 min constant potential polarization at low electrolyte concentration at room temperate.